

**FACT SHEET FOR NPDES PERMIT WA- 000294-1**  
**Equilon Enterprises LLC – Puget Sound Refining Company**  
**SUMMARY**

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## INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the State of Washington on the basis of Chapter 90.48 RCW which defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see **Appendix A--Public Involvement** of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in a Response to Comments.

<b>GENERAL INFORMATION</b>		
<b>Applicant</b>	Equilon Enterprises LLC – Puget Sound Refining Company	
<b>Facility Name and Address</b>	Puget Sound Refining Company South Texas Road March Point PO Box 622 Anacortes WA 98221	
<b>Type of Facility:</b>	Petroleum Refinery	
<b>SIC Code</b>	2911	
<b>Discharge Locations</b>	Waterbody name: Fidalgo Bay	
<b>Water Body ID Number</b>	WA-03-0020	
<b>Process &amp; Stormwater Outfalls</b>		
Outfall 001	Latitude: 48° 30' 34" N	Longitude: 122° 34' 36" W
Outfall 001A	Latitude: 48° 28' 12" N	Longitude: 122° 34' 09" W
<b>Stormwater Outfalls</b>		
Outfall 002	Latitude: 48° 28' 0" N	Longitude: 122° 32' 15" W
Outfall 003	Latitude: 48° 28' 32" N	Longitude: 122° 32' 35" W
Outfall 004	Latitude: 48° 28' 00" N	Longitude: 122° 34' 12" W
Outfall 005	Latitude: 48° 28' 00" N	Longitude: 122° 32' 15" W
Outfall 006	Latitude: 48° 28' 06" N	Longitude: 122° 32' 27" W
Outfall 009	Latitude: 48° 28' 32" N	Longitude: 122° 32' 35" W
Outfall 010	Latitude: 48° 28' 00" N	Longitude: 122° 34' 08" W
Outfall 011	Latitude: 48° 28' 06" N	Longitude: 122° 34' 08" W
Outfall 012	Latitude: 48° 28' 08" N	Longitude: 122° 34' 08" W
Outfall 013	Latitude: 48° 28' 12" N	Longitude: 122° 34' 09" W
Outfall 014	Latitude: 48° 28' 16" N	Longitude: 122° 34' 09" W
Outfall 015	Latitude: 48° 28' 30" N	Longitude: 122° 34' 12" W
Outfall 017	Latitude: 48° 28' 46" N	Longitude: 122° 34' 20" W
Outfall 018	Latitude: 48° 28' 50" N	Longitude: 122° 34' 20" W
Outfall 019	Latitude: 48° 28' 54" N	Longitude: 122° 34' 20" W
Outfall 020	Latitude: 48° 29' 00" N	Longitude: 122° 34' 22" W
Outfall 021	Latitude: 48° 29' 04" N	Longitude: 122° 34' 23" W
Outfall 022	Latitude: 48° 29' 06" N	Longitude: 122° 34' 24" W
Outfall 023	Latitude: 48° 29' 14" N	Longitude: 122° 34' 27" W
Outfall 024	Latitude: 48° 29' 20" N	Longitude: 122° 34' 30" W
Outfall 025	Latitude: 48° 29' 34" N	Longitude: 122° 34' 28" W

## BACKGROUND INFORMATION

### DESCRIPTION OF THE FACILITY

#### HISTORY

The facility was originally constructed in 1957 and 1958. The facility was previously owned and operated by Texaco. Effective July 1, 1998 the facility was transferred to a new owner, Equilon Enterprises LLC, following the joint venture between of Shell and Texaco. The refinery is located on the northwestern coast of Washington on March Point, which extends into Fidalgo Bay to the west and Padilla Bay to the east. The facility is located in Skagit County, approximately five miles east of the city of Anacortes, Washington. The refinery's wastewater outfall (001) is supported on the Equilon shipping pier and extends approximately 5000 feet from the shore in a north/northwesterly direction into Fidalgo Bay. Twenty-five additional stormwater discharges are associated with the refinery. Most of these discharges only drain agricultural land or pipeline right-of-ways. There are three stormwater discharges located on Equilon's property that may contain refinery wastewater constituents (Outfalls 002-004). The Environmental Protection Agency classifies Equilon as a major facility. The location of the outfall is depicted in **Appendix D**.

#### INDUSTRIAL PROCESS

Industrial Process - The refinery was originally designed to process 45,000 barrels (bbls) of crude oil per day. It has been expanded and upgraded since it was built. In 1999 the facility processed in excess of 125,000 barrels of crude oil per day. This is down from 140,000 to 145,000 barrels per day crude throughput, which occurred in 1996 through 1998. Several major events have taken place, which have impacted production at the refinery. In late fall of 1998 an industrial accident occurred in the coker unit which caused a significant decrease in production. In the years 1999 and 2000 Equilon has completed several major equipment turnarounds which kept production numbers down. Equilon anticipates processing crude oil at a rate of at least 144,000 bbls/day for the next NPDES permit term. Since April of 2000 the average crude throughput at the refinery has been 144,00 bbls/day. The majority of crude oil processed at the refinery arrives by tanker from the Alaskan North Slope and by pipeline from Canada. The refinery separates crude oil into its various component parts. Separated components are further processed and blended into a variety of petroleum products. These products include gasoline, jet fuel, diesel fuel, coke, sulfur, and propane. The refinery directly employs about 390 people with an estimated indirect employment of approximately 130 jobs.

#### GENERAL CHEMICAL

General Chemical Corporation discharges wastewater into the Equilon wastewater treatment system. They have been issued a State Waste Discharge Permit ST 7309 by

Ecology's Northwest Regional Office. General Chemical operates a sulfuric acid manufacturing plant consisting of three sulfuric acid sub-plants and two sulfur dioxide abatement units. The plant produces sulfuric acid from spent alkylation acid and hydrogen sulfide gas produced by the Equilon refinery. Wastewater from the facility includes weak acid, stormwater runoff from the process area, washdown, cooling tower blowdown, and occasional spills. The wastewater is contained and treated with sodium hydroxide for neutralization. Neutralized wastewater is settled in two lined lagoons, then pumped into a final storage tank for a pH check prior to being discharged into Equilon's wastewater treatment system. The discharge is limited by pH, flow and total suspended solids requirements.

#### MARCH POINT COGENERATION COMPANY

The March Point Cogeneration Company applied for a state waste discharge permit on September 12, 2000. The facility discharges wastewater into Equilon's treatment system. The discharge includes heat recovery steam generator blowdown, cooling water tower blowdown, MRG waterwash column blowdown, turbine wash effluent, boiler tube wash, sample streams, stormwater runoff, and sanitary wastewater from the March Point Cogeneration Company. This wastewater consists of process wastewaters, stormwater runoff, and sanitary wastewaters from the office building. The wastewater contains traces of BOD, COD, TSS, ammonia, total residual chlorine, nitrogen, phosphate, oil and grease and various metal compounds. The pollutants are similar in nature to those present in the refinery wastewater. The maximum daily wastewater flow from the facility is 125,715 gallons. Uncontaminated stormwater from the facility is discharged through Equilon's stormwater system.

#### AIR LIQUIDE

Air Liquide Corporation applied for a state waste discharge permit on March 20, 2000. The Air Liquide facility extracts nitrogen (N<sub>2</sub>) and oxygen (O<sub>2</sub>) from atmospheric air by cryogenic distillation and supplies it to the refinery. The cooling water discharge from the Air Liquide facility is treated in the wastewater treatment system of the refinery. Stormwater from the Air Liquid facility is also discharged into the refinery's stormwater system. Materials stored on the site include: 55 gallons of lubrication oil, 55 gallons of sodium hypochlorite, 55 gallons of NALCO Chemical 8365 (Orthophosphate) a corrosion control chemical and 55 gallons of sulfuric acid. Wastewater from this facility should be compatible with Equilon's wastewater treatment system

#### WASTEWATER TREATMENT

Wastewater Treatment - In June of 1996, Equilon began construction to upgrade the biological and clarification portions of their effluent treatment plant. The new units came on-line in August of 1997. The upgrade of the biological system included: taking the trickling filter out of service, construction of an oxidation channel and two new clarifiers, retrofitting the old aerator/clarifier units for use as sludge thickeners, and constructing a new biosolids landfarm. Equilon has also upgraded the disinfection system used for treating their sanitary wastewaters.

Process water, domestic wastewaters, and stormwater are currently treated in primary and secondary systems consisting of two tanks (tanks 72 and 73) which serve as both surge and overflow tanks, a three bay API oil/water separator, three dissolved air flotation units, an equalization tank, a three bay oxidation channel, two clarifiers, an intermediary retention basin, a stormwater pond, a final holding pond, and chlorination. Waste activated sludge is aerobically digested in two tanks and then pumped to tank S16 where sludge can be thickened prior to being pumped to a land application site. The refinery also treats wastewater and off-spec products from their off-site petroleum marketing and terminal facilities.

### DISCHARGE OUTFALL

Discharge - Process water, sanitary wastewater, stormwater, and ballast water from the refinery is discharged via a 24-inch multi-port submerged diffuser at Outfall 001. This outfall was constructed in 1993.

The total discharge volume generally ranges from 3.0 to 7.0 million gallons per day (MGD). The highest daily discharge since January of 1991 to the present was 17 MGD, which occurred in December of 1993. More recent maximum discharge values include 12.6 MGD in November 1995, 11.7 in December 1996, 11.7 MGD in March 1997, 11.2 MGD in December 1997 and 11.2 MGD in December 1998. Low flows generally occur in the summer and early fall. The average discharge for the permit term was 3.8 MGD. Equilon has operated in both a continuous pumpout and batch pumpout mode. Currently, treated effluent is being discharged into Fidalgo Bay by a batch pumpout. This offers Equilon the advantage of monitoring the discharge prior to discharge to ensure compliance with NPDES permit standards. Outfall 001A is an emergency bypass of the main effluent outfall. It is an emergency spillway, which prevents overtopping of the dikes during very heavy rainfall events. It has not been used during the current permit term although there was one instance when they were very close to exceeding pumping capacity. There are four other industrial stormwater discharge points at the refinery, Outfalls 003-006, which discharge stormwater with the potential to contain refinery wastewater constituents. Outfall 002 is also an area of concern due to high total suspended solids measured in the discharge. These outfalls are described in more detail in the stormwater section of this document.

### **PERMIT STATUS**

The previous permit for this facility was issued on March 1, 1990. An application for permit renewal was submitted to the Department on February 24, 1994. Stormwater information included in Form 2F was submitted on August 31, 1994. Additional effluent water quality data was submitted on October 6, 1995, as a supplement to the application. Modifications to Form C were submitted June 4, 1997 and June 10, 1999. A modification to Form 2F was also submitted 6/10/99.



The 1990 permit limitations were based on two feedstock rates or tiers. The 1990 permit placed effluent limitations for the first and second tiers on the following parameters tabulated below. Since June of 1990, the feedstock rate has exceeded an average of 116,600 bbls per day and the discharge from Outfall 001 has been subject to the second tier limitations.

**EFFLUENT LIMITATIONS**  
**(Pounds per day)**

PARAMETERS	TIER 1		TIER 2	
	Monthly Average <sup>a</sup>	Daily Maximum	Monthly Average	Daily Maximum
Biochemical Oxygen Demand (5-day) <sup>b</sup>	600	1090	710	1290
Chemical Oxygen Demand <sup>b</sup>	4200	8090	4940	9540
Total Suspended Solids <sup>b</sup>	480	760	570	900
Oil and Grease <sup>b,c</sup>	180	320	210	380
Phenolic Compounds <sup>b</sup>	3.9 <sup>d</sup>	8.1 <sup>d</sup>	4.6 <sup>d</sup>	9.6 <sup>d</sup>
Ammonia as N	370	810	480	1040
Sulfide	3.2	7.1	3.8	8.4
Total Chromium <sup>b</sup>	7.2	16.6 <sup>d</sup>	8.9	19.5 <sup>d</sup>
Hexavalent Chromium <sup>b</sup>	0.6 <sup>d</sup>	1.2 <sup>d</sup>	0.7 <sup>d</sup>	1.5 <sup>d</sup>
pH <sup>e</sup>	Within the range of 6.0 to 9.0			
Fecal Coliform (colonies per 100 mls)	200/100 mls	400/100 mls	200/100 mls	400/100 mls
Residual Chlorine	----	1.0 mg/l	----	1.0 mg/l
Flow (MGD)	----	----	----	----
Feedstock Rate (bbls/day)	----	----	----	----

- a The monthly average is defined as the average of the measured values obtained over a calendar month's time.
- b Additional allocation was permitted for stormwater runoff and ballast water.
- c The concentration of oil and grease in the total discharge through Outfall No. 001 shall at no time exceed 15 mg/l, and shall not exceed 10 mg/l more than three days per month.
- d Based upon previous permit limitation using best practicable technology (BPT) because BPT is more stringent than BAT.

- e Indicates the range of permitted values. Excursions between 5.0 and 10.0 shall not be considered violations provided no single excursion exceeds 60 minutes in length and total excursions do not exceed 7 hours and 30 minutes per month. Any excursion below 5.0 or above 10.0 shall be considered violations. The instantaneous maximum and minimum pH shall be reported monthly.

## SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The most recent compliance inspection including sampling was conducted at the facility on March 13, 2001.

For several years prior to October 1996, Equilon's compliance history included numerous exceedances of BOD, COD, TSS, oil and grease, and fecal coliform permit limitations. These violations were primarily due to heavy rainfall, operator error, treatment units out of service for maintenance and cleaning, spills, equipment failure, and system upsets. Equilon upgraded their treatment facility in 1996 and 1997. Administrative Order DE 96WQ-I035 was issued May 24, 1996 to provide the facility with interim operating limits during the construction activities which began in June 1996 and were completed approximately one year later. Construction was required to be completed by September 1, 1997. The facility was required to be back in compliance with their NPDES permit limitations no later than October 1, 1997. The interim permit limitations are shown in **Appendix E**, which summarizes the discharge monitoring data. Ballast water and stormwater allocations were also modified by the administrative order.

There have been significant improvements in the performance of Equilon's effluent plant since the upgrade of their primary and secondary treatment systems. Since completion of the new wastewater treatment facilities in approximately July 1997, Equilon has not had any violations of their NPDES permit with the exception of a chlorine limit violation in October 1997. This was found to be due to unrepresentative sampling. In response, they adjusted the sampling methods to ensure representative sampling.

A summary of discharge monitoring data is included in **Appendix E**.

The previous permit required a number of special studies to be completed during the term of the permit. Studies of the effluent included: an organic sulfur and nitrogen compounds study, a cyanide study, a dioxin and furan study, a dilution ratio study, an acute biomonitoring study, a chronic biomonitoring study, and chemical analysis of the influent and effluent. Sediment monitoring studies included an acute biomonitoring study, chemical analysis of the sediment, and a benthic macroinvertebrate study. All of the studies were completed as required by the NPDES permit. The results of the studies were used in preparation of the proposed NPDES permit as discussed in the fact sheet.

The cyanide study completed as part of the previous permit was submitted in November 1990. That data and subsequent data are used later in this document to evaluate water quality impacts.

A dilution ratio study was completed and submitted in May of 1992. This information, following Ecology review and concurrence, was used to establish an allowable mixing zone and determine the necessity for water quality-based limits for pollutants of concern. The modeling used to establish mixing zones was updated in July of 1999 to conform to the current conditions at the facility.

The biomonitoring studies were completed throughout the term of the NPDES permit. The information generated was used to establish the need for whole effluent toxicity (WET) permit limits.

The sediment monitoring studies were completed in the second year of the permit term and a report was submitted in August of 1992. The information was reviewed to determine if any additional data collection is necessary.

The dioxin furan study was evaluated and is discussed later in the fact sheet.

The organic sulfur and nitrogen compounds study was required to address odor problems from the wastewater facility. The results of the study concluded several surface impoundments regulated by hazardous waste rules were the source of the odors. These impoundments were closed under the requirements of hazardous waste regulations during the term of the permit and were replaced by tank storage.

## **WASTEWATER CHARACTERIZATION**

The proposed wastewater discharge was characterized by Equilon in the application process for conventional pollutants, metals, cyanide, phenols, volatile organic compounds, acid organic compounds, and base neutral organic compounds. Priority pollutant scans for organics and metals were completed several times during the term of the permit.

Maximum daily values of pollutants with significant concentrations and/or of interest are tabulated below. This information was compiled from a review of historical monitoring data including data from: the cyanide study; the 1991-1992 influent/effluent study; Ecology's sampling inspections; the application for permit renewal; Equilon's 1990-1994 effluent plant surveys; and discharge monitoring reports. Conventional parameter data reported below is based on extensive (daily to weekly) monitoring completed during the term of the permit. The organics listed in the table include all of those that were quantified at greater than detection limits. Chromium and hexavalent chrome maximums were taken from the last 5 years of data because the use of chromium has been discontinued in the refinery cooling water system, which makes earlier data unrepresentative. Some of the data listed may not actually represent current operations since it was collected prior to the upgrade of the wastewater treatment plant.

MAXIMUM DAILY VALUES OF POLLUTANTS					
PARAMETER	CONCENTRATION	PARAMETER	CONCENTRATION	PARAMETER	CONCENTRATION
BOD	83.5 mg/l			Lead	0.009 mg/l
COD	836.5 mg/l	Oil and Grease	23.9 mg/l	Mercury	0.00014 mg/l
TOC	39 mg/l	Phenols	0.628 mg/l	Nickel	0.081 mg/l
TSS	70.5 mg/l	Phosphorous	6.4 mg/l	Selenium	0.077 mg/l
Ammonia	39.3 mg/l	Sulfate	388 mg/l	Silver	<0.001 mg/l
Temperature (winter)	23°C	Sulfide	0.6 mg/l	Zinc	0.546 mg/l
Temperature (summer)	31.8°C	Surfactants	0.2 mg/l	Cyanide (WAD)	0.012 mg/l
pH	6.0 minimum, 8.9 maximum	Arsenic	0.016 mg/l	Carbon Disulfide	0.001 mg/l
Chlorine (Total Residual)	1.6 mg/l	Cadmium	0.0227 mg/l	Chloroform	0.00024 mg/l
Fecal coliforms	7190 colonies/100ml	Chromium (Total)	0.0035 mg/l	Chrysene	0.00033 mg/l
Nitrate	3.66 mg/l			Isophorone	0.00046 mg/l
Nitrogen (Total Organic)	6.4 mg/l	Chromium (Hexavalent)	< 0.002 mg/l	Pyrene	0.00034 mg/l
		Copper	0.021 mg/l		

## PROPOSED PERMIT LIMITATIONS

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations are based upon the treatment methods available to treat specific pollutants.

Technology-based limitations are set by regulation or developed on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992). The more stringent of these two limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the State of Washington were determined and included in this permit. Ecology does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation. Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department of Ecology. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

## TECHNOLOGY-BASED EFFLUENT LIMITATIONS

### PROCESS WASTEWATER

The effluent limitations for the Equilon refinery are based on Best Conventional Pollutant Control Technology (BCT), Best Available Technology Economically Achievable (BAT), Best Practicable Control Technology Currently Available (BPT), and New Source Performance Standards (NSPS) developed by the Environmental Protection Agency (EPA). Guidelines for developing effluent limitations were published August 12, 1985 under 40 CFR Part 419 by the Environmental Protection Agency (EPA) for the cracking subcategory of petroleum refining. These limitations are based on terms of a settlement agreement dated April 17, 1984, between EPA and the Natural Resources Defense Council resolving litigation about the EPA guidelines. The August 12, 1985 guidelines establish Best Available Technology (BAT) and Best Conventional Technology (BCT) as equal to Best Practicable Technology (BPT) for all parameters except phenols and chromium. Phenols and chromium are regulated by whichever

guideline is more stringent. All known, available, and reasonable methods (AKART) to control toxicants in the applicant's wastewater shall be used.

The federal effluent guidelines for petroleum refining were promulgated in 1982. Ecology's process in cases where the effluent guidelines are over 5 years old is to review the EPA development document and compare the production processes, the pollutants generated, the treatment efficiencies and review unit process design. This process is to verify that the effluent guidelines meet the intent of RCW 90.48.520 (AKART). In preparation of the Equilon permit, Ecology compared current information on the Equilon refinery with the data that formed the basis for the existing guidelines. It should be noted that the Equilon wastewater treatment facility was very recently upgraded to provide up-to-date primary and secondary treatment capabilities.

EPA recently completed a study of the petroleum refining industry (EPA-821-R-96-015) including treatment technologies, pollutants discharged, pollutant loadings, and potential water quality impacts. Based on this review, the petroleum refining industry was not selected as a candidate for revised effluent guidelines in EPA's biennial plan for 1998 through 1999. EPA determined that the best treatment technology currently available is essentially the same as that applied at the time the effluent guidelines were originally promulgated. They found that if the wastewater treatment systems at the refineries are properly operated and maintained, priority pollutants will be removed or treated to negligible or below detectable levels.

It is Ecology's determination that the Equilon refinery is applying AKART in treating their wastewater. We made that determination through an analysis of current refinery conditions and comparison to the effluent guidelines development document. EPA's study conclusions also support Ecology's determination.

Ecology has also applied new source performance standards on the basis of AKART, which makes the permit limitations more stringent than those applied in other states. The more stringent new source performance standards have been applied to all crude throughput increases since 1984.

Ecology has also decided to include an NPDES permit condition to require that Equilon submit an engineering report that provides predicted design capacities for their wastewater treatment system based upon current operating conditions. This permit condition also requires that Equilon collect additional treatment unit influent and effluent data. The data will be evaluated to determine current treatment unit operating efficiencies. This permit condition will ensure that Equilon is continuing to apply AKART to their wastewater.

Since the previous NPDES permit was issued on March 1, 1990, the refinery's crude oil throughput rate has changed. A variety of operational problems have impacted facility operation over the last few years. The highest 12-month rolling average for the facility was 144,000 bbls/day from August 1997. Equilon anticipates being at or above this crude throughput for the duration of the proposed NPDES permit. The rate changes in

refinery processes are shown below along with the applicable size and process factors selected from the EPA effluent limitation guidelines. Size and process factor determination is documented in **Appendix F**. The size and process factors are multiplied by the actual feedstock rate to obtain an adjusted feedstock rate used in determining effluent limitations, except for determining BAT limitations for phenols and chromium. The following table lists the refinery processes, flows, and process and size factors as calculated in **Appendix F**.

	<b>1984 Permit</b>	<b>1990 Permit</b>	<b>Proposed Permit</b>
Actual Feed Stock, bbls/day	83,000	98,500*	144,000
Desalting, bbls /day	83,000	98,500	144,000
Atmospheric Distillation, bbls/day	83,000	98,500	144,000
Vacuum Distillation, bbls/day	31,800	35,800	60,100
Fluid Catalytic Cracking, bbls/day	40,000	35,000	50,100
Coking, bbls/day	13,000	20,700	24,600
Butane Deasphalting, bbls/day	----	4,600	0
Hydrotreating, bbls/day	33,300	33,300	71,500
H <sub>2</sub> SO <sub>4</sub> Alkylation, bbls/day	10,000	10,000	9,600
Catalytic Reforming, bbls/day	18,800	18,800	24,700
Process Factor	0.88	1.09	1.0
Size Factor	1.13	1.13	1.35
Adjusted Feed Stock, bbls/day	82,535	121,322	194,400
New Source Performance Standards Increment, bbls/day	----	38,787	111,865

\* All feedstock rates specified in this permit represent actual crude throughput less slop oil and other recycled material.

Increases in the feedstock rate are subject to limitations determined by Ecology to be the treatment level obtained from using all known, available, and reasonable treatment methods. They are therefore subject to New Source Performance Standards. These limitations were calculated by multiplying the increase in adjusted feed stock, (194,400 – 82,535 = 111,865 barrels (bbls) per day) by New Source Performance Standards (NSPS). The resulting NSPS increment, based upon a current feedstock rate of 144,000 bbls per day, was then added to BAT and BPT limitations, based upon the

adjusted baseline feedstock rate of 82,535 bbls per day. BCT limitations were not included because they are equivalent to BPT limitations.

The EPA/NRDC settlement agreement provided separate factors for calculating phenols, total chromium, and hexavalent chromium for the BAT limitation. These calculations required feedstock rate data for additional processes including: hydrotreating, catalytic reforming, and alkylation. This information is included in the above table.

The permit limit calculations are tabulated in **Appendix G**. The actual permit limit is the more stringent of the BAT and BPT determinations. BPT limitations are more stringent for phenols and BAT limits are generally more stringent for chromium. The proposed effluent limitations are listed in the table below in pounds per day.

PARAMETERS		
(pounds/day unless otherwise specified)	Monthly Average	Daily Maximum
Biochemical Oxygen Demand (5-day)	801	1466
Chemical Oxygen Demand	5519	10750
Total Suspended Solids	643	1017
Oil and Grease	236	438
Phenolic Compounds	5.2	10.8
Ammonia as N	583	1283
Sulfide	4.3	9.5
Total Chromium	10.3	21.8
Hexavalent Chromium	0.76	1.70
pH shall be maintained within the range of 6.0 to 9.0.		
Fecal Coliform (colonies per 100 mls)	200/100 mls	400/100 mls

In the previous permit, total chromium and hexavalent chromium were further limited such that combined discharges for process wastewater, ballast water and stormwater in no case exceeded the sum of the NSPS increment plus what was calculated as BPT for the baseline permit. In approximately 1989 the refinery discontinued using chromium in their cooling water treatment program. This has significantly reduced the amount of chromium discharged into the wastewater system. The concentration of chromium, as measured by the facility, has been at undetectable levels for the last several years. Ecology sampling inspections have



confirmed this with non-detectable chromium levels above 5 µg/l. Based on this performance the stormwater allocation has not been included in the permit. Equilon will be limited to the more stringent BAT/BPT chromium allocations for the process wastewater with no stormwater allocations.

#### BALLAST AND STORMWATER ALLOCATIONS

##### **Background Information**

Contaminated stormwater from the process areas is discharged to the oily water sewer and is treated at the wastewater treatment facility. Stormwater runoff from the tank farms and areas with no potential for contamination is discharged to the clean water sewer system. The clean water sewer is used only if the waters are found to be uncontaminated, otherwise they are discharged to the oily water sewer. Stormwater from the clean water sewer is discharged to the clean water flume adjacent to the final pond at the effluent treatment plant. Some settling occurs in this pond and oil and grease can be skimmed from the surface as necessary. Stormwater is then discharged into the final pond where it is commingled with the treated process wastewater prior to discharge. Ballast water is occasionally discharged into the process wastewater treatment system.

Stormwater flow is not directly measured at the facility. Direct measurement would be difficult since a portion of the stormwater is diverted into the oily water sewer at many collection points and a portion of the stormwater is collected in the stormwater system. The stormwater flow is calculated by the subtraction of an estimated dry weather flow from the total flow discharged each day.

Dry weather flow for current crude throughput conditions was estimated in several different ways. Equilon estimated dry weather flow by calculating the amount of runoff from the industrial site with known acreage and daily rainfall measurements. Using an industrial site runoff factor of 0.8 and the last two years of data they estimated a dry weather process flow of 2.97 MGD. They also performed a water balance at the process units and came up with an estimate of 3.02 MGD. There is some uncertainty in both these methods because of the assumptions made in the process.

Equilon provided the daily flow and rainfall information in an electronic format. To analyze dry weather conditions I sorted the data removing all data where rain fell within three and five days of the data point. Additionally I sorted that data by removing the wet weather months entirely. This analysis indicates a dry weather flow of approximately 3.5 MGD. The data analysis better reflects the actual process wastewater contributions versus stormwater flow.

Based on these analyses a dry weather flow of 3.5 MGD is proposed for the facility.

The ballast and stormwater allocations in the permit are based on guidelines in 40 CFR 419.12(c) and 419.22(e). As stated in the previous section, chromium will not be given

a stormwater allocation based on the performance of the facility. The allocations for stormwater provided in the guidelines were intended to apply to runoff from areas associated with industrial activity, not outlying areas such as parking lots and surrounding acreage. Equilon's employee parking lots do, however, discharge into the stormwater flume. The allocations are tabulated below.

Parameters	Stormwater Allocation lbs./million gallons		Ballast Water Allocation lbs./million gallons	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Biochemical Oxygen Demand (5-day)	220	400	210	400
Chemical Oxygen Demand	1500	3000	2000	3900
Total Suspended Solids	180	280	170	260
Oil and Grease	67	130	67	126
Phenolic Compounds	1.4	2.9	----	----

## STORMWATER DISCHARGE MONITORING

In 1988 sampling was completed at Outfalls 002 through 005. Parameters tested included pH, BOD, COD, TOC, TSS, ammonia, flow, color, fecal coliforms, nitrate-nitrite, TKN, O&G, phosphate, sulfate, sulfides, priority pollutant metals, cyanide, phenols, volatile organics, acid organics, base neutral organics and pesticides. First flush samples of Outfalls 002 through 005 were collected and tested. No composites from the total storm were collected. Results were included in the NPDES permit application submitted 12/27/1988, which were evaluated during drafting of the current permit.

On April 9, 1990 the refinery submitted a stormwater study plan as required by NPDES permit Special Condition S4 (k) in their newly issued permit. On March 31, 1993 the refinery submitted a revised stormwater study plan. An Ecology letter dated June 23, 1993 approved this study plan. The sampling plan was designed to be in accordance with 40 CFR 122.21(f)(7), 40 CFR 122.26(c).

The plan included a topographic map with drainage areas, drainage control devices, receiving waters, and waste treatment, storage, and disposal areas identified. The surface area was included for each basin. Information on any spills or leaks, which

occurred in the previous three years in the basins, was included. Existing sampling data was included for all of the NPDES limited pollutants and nutrient parameters. Twenty-five stormwater outfalls were identified. The refinery identified 5 outfalls, which required further sampling.

The report included a plan for future sampling of outfalls 003 through 005, 017 and 024. The storm event was to conform with the conditions that follow: a storm of greater than 0.1 inches with at least 72 hours of no prior storm, and the duration and the total rainfall of the event were not to exceed 50% of the average event in the area. The facility would use a flow-weighted composite from the first three hours of the event, and grab a sample from the first 30 minutes of the event.

Stormwater samples were collected on September 15, 1993 and April 6, 1994 at outfalls 002, 003, 004, 005, and 017. Grab samples taken during the first half-hour were analyzed for pH, phenols, O&G, TSS, BOD, COD, ammonia, nitrate-nitrite, total nitrogen, total phosphorous, and total chromium. Composite samples were collected and tested for BOD, COD, TSS, ammonia, nitrate-nitrite, total nitrogen, total phosphorous, pH, phenols, and total chromium. Grab samples were also collected and analyzed for a suite of 31 metals. The information collected was included in the NPDES Application Form 2-F submitted August 31, 1994. The data is summarized in **Appendix H**.

In August of 2000 the refinery submitted an adjusted stormwater outfall map. This map identified changes to the system. Several drainage areas have a combined discharge point. The table which follows identifies the stormwater outfalls, the activities within the basins, and whether or not they will be required to be monitored on an ongoing basis.

Stormwater Outfalls – Identification of On-Site Activities												
Outfall #	Area (Acres)	Monitoring Required	Industrial Activity	Spills within the last 3 years	Pipeway	Road	Woods	Agricultural Land	Train Tracks	Wastewater Treatment Plant Dikes	Parking	Other
001	377	x	x	x	x	x		x	x	x	x	Treated Stormwater/process wastewater
001A												Emergency bypass for Outfall 001 – weir
002	26.5	x				x					x	Contractor Parking
003	54.6	x	x		x	x		x				Recovery yard, cooling tower

Stormwater Outfalls – Identification of On-Site Activities												
Outfall #	Area (Acres)	Monitoring Required	Industrial Activity	Spills within the last 3 years	Pipeway	Road	Woods	Agricultural Land	Train Tracks	Wastewater Treatment Plant Dikes	Parking	Other
004					x	x	x	x				Emergency bypass for booster pump basin
005	41.3	x	x			x	x					Wood & Old metal storage
006	12	x	x				x		x			Sulfur tanks, laydown area
009	10.5					x	x	x				Clean dirt stockpile
010	18					x	x	x	x			Lawn/field
011	3.6					x				x		Wastewater treatment plant field
012	1.1					x				x		Wastewater treatment plant dikes
013	0.6					x				x		Wastewater treatment plant dikes
014	6.5				x	x		x	x			Fields around truck rack containment
015	8.1					x		x				Hayfield
017	1.1				x	x		x				Pipeline to wharf
018	0.5				x	x		x				Pipeline to wharf
019	0.5				x	x		x				Pipeline to wharf
020	0.5				x	x		x				Pipeline to wharf
021	0.5				x	x		x				Pipeline to wharf
022	1.1				x	x		x				Pipeline to wharf
023	0.5				x	x		x				Pipeline to wharf
024	5.9				x	x		x				TARA campground
025	15.7				x	x		x			x	Wharf parking

Prior to discharging at outfall 003 this basin flows to a concrete basin with an underflow weir for oil skimming. The outfall 004-drainage area was associated with a catastrophic spill of crude oil due to a booster pump failure, which occurred February 22, 1991. This area is discharged to the wastewater treatment plant. Only in the event of a pump failure would this area discharge through Outfall 004. Outfall 017 was associated with a pinhole leak of an underground bunker fuel line which caused bunker oil to accumulate in a ditch, which occurred on January 15, 1992. Outfall 024 was associated with a spill of ballast oil to a ditch, which occurred March 25, 1992. Outfall 002 is a contractor parking lot and the area does not meet the definition of industrial activity, however, the

total suspended solids discharged from that area are relatively high and deserve further attention.

The decision to have continuing monitoring was made depending on whether or not the area has industrial activity, if there had been recent spill activity (within three years), or if the existing data suggests additional monitoring should be completed.

No limits will be established for discharges from these outfalls in this permit. Equilon will be required to sample stormwater outfalls 002, 003, 005 and 006 twice annually during the term of the permit during a qualifying storm for the following parameters: O&G, BOD, COD, pH, and TSS. Outfalls 017 and 024 were eliminated from sampling as the available data and the elapsed time from the original spill event, which caused them to be classified as being industrially influenced has exceeded 8 years. Outfalls 002 and 005 commingle near the source of the flows. Equilon will be allowed to monitor this discharge after commingling to minimize the number of samples collected. If the data collected indicates the discharge is contaminated then sampling will have to be repeated at both outfall locations to determine the source.

Equilon will be specifically required to evaluate stormwater basins in their pollution prevention plan to ensure that proper BMP's are in place to prevent excessive sediments from being discharged. The drainage basin for Outfall 002 will be specifically included as an area to investigate in the pollution prevention planning. If best management practices are put in place and the TSS decrease to acceptable levels the monitoring requirements will be revised or discontinued. The results of the stormwater monitoring will be evaluated to monitor improvement in performance as a result of BMP's implemented during the permit cycle. **Appendix I** is a map of the stormwater outfalls on the refinery property.

## CONSTRUCTION PROJECT STORMWATER DISCHARGE REQUIREMENTS

New federal regulations will require Equilon to produce low sulfur gasoline and diesel. To comply with these regulations Equilon will be required to construct a number of additional process units. Three areas in the refinery will be impacted by these construction projects. These areas are identified on a map included in **Appendix J** and discussed below.

**Area 1** – Equilon will construct a parking and laydown area to facilitate construction of the low sulfur fuels projects. The proposed construction dates are between September 2001 and March of 2002.

**Area 2** – A low sulfur gasoline unit and associated refinery equipment is planned for construction in this area between March 2002 and September 2003. Equilon is also planning to construct a hydrotreater in this area between January 2004 and June 2006.

**Area 3** – A hydrogen generation unit (or alternative process unit) is planned for construction in this area between August 2002 and September 2003. This project will include access roads, piping, tanks and other appurtenances and/or movement/demolition of existing equipment as necessary for the effective completion of the total project.

A requirement will be included in the permit addressing stormwater controls during construction of these projects.

## **FIREWATER TESTING**

Equilon uses treated effluent in their firewater system at the dock. In the event of a fire at the dock wastewater effluent is used for fire suppression. The system is tested approximately once per month. The system consists of two remote controlled tower mounted fire monitors and an under dock sprinkler. The under dock sprinkler is divided into 3 zones. The flow rate of effluent in the sprinkler system is 2500 gpm (3.6 MGD). The tower-mounted monitors are capable of a 360° horizontal rotation and a 110° vertical rotation. The monitors are remotely adjustable from stream to spray and can be operated simultaneously. The flow from the monitors is up to 975 gpm (1.4 MGD). They test for approximately one to two hours monthly. During testing they generally have one tower monitor and two underdock sprinklers on at any one time. At full capacity they would discharge from 0.36 to 0.71 million gallons during the test period. This is about 10 - 20 % of the daily dry weather (3.5 MGD) flow at the facility.

Foam can also be used to fight fires. A 4500-gallon foam (flouoroprotein) tank is also available for fire suppression. At maximum usage rate the foam tank has enough storage capacity for approximately 20 minutes of use. The foam is made up of water and a protein hydrolysate. Formulation chemical percentages are as follows: 6% ethylene glycol, 6 % hexylene glycol, and 2% ferrous sulfate. The pH is 7.3. Safety precautions for use include rubber or PVC gloves and eye protection. Foam is not used during testing of the system.

The spray from the monitors can reach a radius of up to 200 feet. There are three under dock zones of different lengths. Their lengths are approximately 130 feet, 230 feet, and 250 feet. When in operation the width of the underdock spray is approximately 100 feet. The diffuser is 200 feet long with 24 ports. The actual area of the chronic mixing zone is approximately 325,000ft<sup>2</sup>. The area of the water surface being sprayed at any one time during testing is approximately 14,000 ft<sup>2</sup> to 170,000 ft<sup>2</sup> depending on the conditions of the test.

During firewater system testing less than 25% of dry weather flow is being discharged over the above estimated spray area. The remaining wastewater effluent over and above that needed for the system test is being discharged through the diffuser. The diffuser and the associated dilution zone is adjacent to the dock

and to the firewater system spray areas with some overlap. During testing the overall dilution should be greater than that through the outfall alone due to the additional area over which wastewater is sprayed and therefore mixed.

## **DESIGN CRITERIA**

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

Design criteria for this treatment facility established in a July 25, 1995 engineering report prepared by Dow Environmental were approved by Ecology in 1995. These design criteria do not reflect the actual operational capability of the treatment facility as demonstrated by Equilon.

### TREATMENT SYSTEM EFFICIENCY STUDY AND ENGINEERING REPORT

Equilon provided Ecology with some data to evaluate treatment efficiencies at the newly upgraded wastewater treatment plant. Additional data collection is necessary to supplement that information. The proposed permit includes a study to evaluate the efficiency of the wastewater treatment system. Samples of influent and effluent will also be analyzed for priority pollutants. Flow monitoring done at the time of sampling will provide information on how the system operates at different hydraulic or organic loading rates. Equilon will be required to calculate treatment and removal efficiencies from the results of the analysis and submit the data to Ecology. The Department will review the data and compare it to published information on wastewater treatment efficiencies. If it is found that the Permittee's effluent plant is performing below acceptable levels, Ecology will require Equilon to upgrade their wastewater treatment system.

In addition to the treatment efficiency study, Ecology is requiring the Permittee to prepare and submit an engineering report on their wastewater treatment system in accordance with Chapter 173-240 WAC. Based on the treatment efficiency study and any other relevant information the refinery will evaluate the actual design capacity of the system. Approved design criteria will be included in the next NPDES permit cycle

The Department will consider requiring a treatment efficiency study and engineering report during each permit cycle as a means of continually evaluating the adequacy of the wastewater treatment at the Equilon refinery.

## **SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS**

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Surface water quality-based effluent limitations may be

based on an individual waste load allocation (WLA) or on a WLA developed during a basin wide total maximum daily loading study (TMDL).

#### NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

#### NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The U.S. EPA has promulgated 91 numeric water quality criteria for the protection of human health that are applicable to Washington State (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

#### NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

#### ANTIDegradation

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

#### CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.



### MIXING ZONES

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

### DESCRIPTION OF THE RECEIVING WATER

Fidalgo Bay is designated as a Class A marine receiving water in the vicinity of the outfall. Characteristic uses include the following: fish migration; fish and shellfish rearing, spawning, and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

The Tesoro Northwest Company is located on property to the north of Equilon's facilities. Tesoro's wastewater treatment plant outfall is located in the vicinity of the Equilon outfall at a latitude of (48N 30' 30" and a longitude of 122W 34' 00"). The outfalls are physically located within 3000 feet of each other.

The closest Department of Ecology long-term core monitoring station is BLL009 in Bellingham Bay. This station is influenced by activity in Bellingham and is not suitable for a background data station. The next closest long-term core monitoring station is GRG002, located in the Georgia Strait. There is substantial data for this station. The closest long-term rotating station is FID001 in Fidalgo Bay. There is very limited data available for this monitoring station. A similar embayment with more extensive data is LOP001 in Lopez Sound.

Background receiving water data for metallic parameters was obtained from a study undertaken by a group of Washington State refineries. The study included 10 samples taken at three different locations within the Puget Sound, in an effort to provide representative information about the receiving water outside the influence of the refineries. The sampling period was chosen to represent the critical period in the receiving water. The study was completed in the fall of 1997 and results were submitted to Ecology in March 1998.

### SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992).

Criteria for this discharge are summarized below:

Fecal Coliforms	14 organisms/100 ml maximum geometric mean
Dissolved Oxygen	6 mg/l minimum
Temperature	16 degrees Celsius maximum or incremental increases above background
pH	7 to 8.5 standard units
Turbidity	less than 5 NTU above background
Toxics	No toxics in toxic amounts (see <b>Appendix C</b> for numeric criteria for toxics of concern for this discharge)

Padilla Bay, Fidalgo Bay and Guemes Channel are listed on the 1998 CWA 303(d) list. The pollutant of concern is PCB-1254. A 1996 tissue sample from mussels collected from a site near the old pilings near Joe Leary Slough exceeded the National Toxics Rule Criterion for PCBs. The Equilon refinery is not a current source of PCB's. A TMDL was identified as the action required. A TMDL is not currently planned for this waterbody.

### CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

#### **Mixing Zone Authorization**

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls, which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and is defined as follows:

#### **Diffuser Information**

Equilon 's diffuser is 200 feet long with a diameter of 24 inches. It consists of 24 ports, each of which is 4 inches in diameter. The distance between ports is 8 feet. The MLLW depth at the diffuser is 40 feet. This information and additional information is available in the Outfall Dilution Study Report submitted to Ecology in May of 1992.

#### **Chronic Mixing Zone**

WAC 173-201A-100(4)(b)(i) specifies mixing zones shall not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of

water over the discharge ports as measured during mean lower low water (MLLW). Given a MLLW water depth of 40 feet (12.2 meters) for Equilon 's outfall, the horizontal distance is 240 feet (73.2 meters). The mixing zone extends from the seabed to the top of the water surface.

### Acute Mixing Zone

WAC 173-201A-100(8)(b) specifies that, in estuarine waters, a zone where acute criteria may be exceeded shall not extend beyond 10% of the distance established for the maximum or chronic zone as measured independently from the discharge ports. The acute zone therefore extends 24 feet (7.3 meters) from the discharge ports.

The dilution factors of effluent to receiving water that occur within these zones have been determined by the use of a dye study and the use of modeling. This study was a dye study entitled, "Dilution Ratio Study The model used for near field effects was the EPA funded dilution model UDKHDEN. Far field effects were predicted using the EPA PLUMES model (EPA/600/R-94-086) with the addition of a linear eddy diffusivity algorithm based on the Brooks model as presented by R. A. Grace, Marine Outfall Systems: Planning, Design, and Construction, Prentice-Hall, Inc.

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition under the batch flow pumpout condition. Critical conditions were assumed to occur between May and October of each year. These dilution factors were updated by Ecology in July of 1999 to reflect current and projected operating conditions at the Equilon discharge. The dilution factors have been determined to be:

	Acute	Chronic
Aquatic Life	62	127
Human Health, Carcinogen		152
Human Health, Non-carcinogen		127

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of surface water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

BOD<sub>5</sub>--This discharge with technology-based limitations results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. Technology-based limitations will be protective of dissolved oxygen criteria in the receiving water.

### Temperature--

The water quality standards state the temperature shall not exceed 16°C due to human activities. When natural conditions exceed 16°C no temperature increases will be allowed which will raise the receiving water temperature greater than 0.3°C. Incremental temperature increases resulting from point source activities shall not, at any time, exceed  $t=12/(T-2)$ . T represents the background temperature and represents the highest ambient water temperature in the vicinity of the discharge.

The impact of the discharge on the temperature of the receiving water was modeled by simple mixing analysis at critical condition. The receiving water temperature critical condition was determined using the 90th percentile value of the temperatures recorded at the ambient monitoring station GRG002 (1988 through 1997). The receiving water temperature at the critical condition is 11.0°C and the maximum summertime effluent temperature is 30.6°C. With a dilution of 127:1 at the edge of the chronic zone the predicted resultant temperature at the boundary of the chronic mixing zone is 11.15°C. This was calculated using a simple mass balance equation as follows:  $[11.0(127) + 30.6(1)]/128 = 11.15^{\circ}\text{C}$ . This temperature meets the water quality standards.

The highest recorded temperature at GRG002 (from 1988 to 1997) was 19.3°C. The incremental temperature increase allowance in marine water ( $t = 12/(19.3-2)$ ) is equal to 0.7°C. With a receiving water temperature of 19.3°C and an effluent temperature of 30.6°C the predicted temperature at the edge of the dilution zone is equal to 19.4°C. The temperature increase of 0.1°C is less than the incremental temperature allowance (0.7°C) or the maximum allowable increase of 0.3°C allowed by water quality standards. The receiving water temperature at the edge of the dilution zone was calculated as follows:  $[19.3(127) + 30.6(1)] / 128 = 19.4^{\circ}\text{C}$ .

Under these conditions there is no predicted violation of The Water Quality Standards. An effluent limitation was determined not to be necessary.

pH--Because of the high buffering capacity of marine water, compliance with the technology-based limits of 6 to 9 will assure compliance with the Water Quality Standards for Surface Waters.

### **Fecal Coliforms**

The refinery is required to meet domestic technology-based effluent limits for fecal coliforms in their effluent since domestic wastewater is treated in their wastewater facility. Domestic wastewater standards are established in Chapter 173-221 WAC, entitled "Discharge Standards and Effluent Limitations For Domestic Wastewater Facilities". Domestic effluent limits, for fecal coliforms, are 200 organisms/100 ml on a monthly average basis with a maximum of 400 organisms/100 ml in any one sample. The water quality standard for marine Class A receiving waters is 14 organisms/100 ml. Equilon is required to meet this water quality standard at the edge of the chronic zone. With a dilution of 167:1, the predicted fecal coliform concentration at the boundary of the

chronic mixing zone is 2.4 organisms/100 ml, if the maximum technological concentration standard of 400 is met. This value was calculated using a simple mass balance equation as follows:  $[0(167) + 400(1)]/168 = 2.4$

The technological standard is therefore protective of the water quality standard.

Turbidity--The impact of turbidity was evaluated based on the range of turbidity in the effluent and turbidity of the receiving water. Due to the large degree of dilution, it was determined that the turbidity criteria would not be violated outside the designated mixing zone.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

The Department has determined through review of available effluent data and knowledge of the refinery process that the applicant has the toxic pollutants: ammonia, arsenic, cadmium, chromium (hexavalent), copper, cyanide, lead, mercury, nickel, selenium, silver, sulfide, and zinc in their effluent. All of these pollutants may not be present in the current discharge due to process and wastewater treatment changes. A reasonable potential analysis (See **Appendix K**) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit.

The determination of the reasonable potential for the parameters listed above to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (**Appendix K**) at the critical condition. Ammonia is discussed more specifically below. Metals effluent data from information collected by both Ecology and Equilon was used in the analysis. Valid ambient background data was available for the ammonia and the metals analysis. The dilution factors determined above were used in the analysis (acute dilution factor 62, chronic dilution factor 127).

Calculations using all applicable data resulted in a determination that there is no reasonable potential for this discharge to cause a violation of water quality standards. This determination assumes that the Permittee meets the other effluent limits of this permit.

## Chlorine

Total residual chlorine was determined to have reasonable potential to violate water quality standards at technology based permit levels therefore water quality based permit limits were developed and included in the permit. A water quality based limit for chlorine was determined using one of Ecology's permit Excel spreadsheet tools. The spreadsheet is included in **Appendix L**.

## Ammonia

Ammonia is considered to be a toxic pollutant and was evaluated for reasonable potential to exceed water quality standards. Determining the site specific acute and chronic criteria for ammonia is slightly more complicated than simply obtaining the criteria from the regulations and comparing to the effluent data. Ammonia's toxicity is dependent on that portion which is available in the unionized form. The amount of unionized ammonia is dependent on the pH, dissolved oxygen, and salinity of the receiving water in the marine environment. In order to evaluate ammonia toxicity, receiving water information must be used.

Two ambient receiving water stations were evaluated to determine the site-specific acute and chronic criteria and to obtain background ammonia data. The Ecology ambient monitoring stations GRG002 and LOP001 were used in this analysis. GRG002 is located in the Georgia Strait and is a long-term core station for which substantial data exists. LOP001 is located near Lopez Island and represents an area similar to the location of Equilon's discharge but remains largely unimpacted by pollution. Using Hampson's model in a spreadsheet form, the acute and chronic ammonia criteria were calculated. From those criteria, the 90th percentile value was chosen to represent the critical condition as recommended by the Ecology Permit Writer's Manual. The values for both ambient stations and the 90th percentile values for background total ammonia concentration were used in the reasonable potential calculation shown in **Appendix K**.

Effluent ammonia data was used as part of the evaluation. Effluent ammonia is measured each day at the Equilon refinery. In order to determine reasonable potential, several statistics are necessary. To estimate the coefficient of variation and the maximum effluent concentration, five months of data (January 1999 - April 1999 - 120 data points) was used. The coefficient of variation is the standard deviation divided by the mean and is a measure of the variability of the parameter in the effluent. The 95% value for the ammonia concentration was 12.1 mg/l.

Using all of the above information, reasonable potential was determined. With the available dilution, it was determined that there is no reasonable potential for Equilon to exceed water quality standards for ammonia at the edge of the dilution zone. The waste load allocation for ammonia at the edge of the acute zone is approximately ten times higher than effluent data and the waste load allocation at the edge of the chronic zone is a hundred times higher. This analysis is attached in **Appendix K**.

With the available dilution at Equilon, the technology based effluent limit for ammonia is sufficiently protective of water quality standards.

### WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the

response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC<sub>50</sub>, EC<sub>50</sub>, IC<sub>25</sub>, etc. All accredited labs have been provided the most recent version of the Department of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* which is referenced in the permit. Any Permittee interested in receiving a copy of this publication may call the Ecology Publications Distribution Center 360-407-7472 for a copy. Ecology recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

### Acute Toxicity

As required in the current permit, the refinery conducted a one-year acute WET characterization study that included bimonthly samples and acute bioassay testing in 100% final effluent using three organisms. The three organisms tested were rainbow trout, fathead minnow, and *Daphnia pulex*. The results of the acute characterization study are tabulated in **Appendix M**.

The criteria for deciding if an acute WET limit is required is a median survival of 80% in 100% effluent and no test with a survival of less than 65%. The results for rainbow trout had two tests at 0% survival in 100% effluent, where chlorine was suspected. The fathead minnow results had three tests below 65% survival in 100% effluent and the *Daphnia pulex* had sixteen tests below 65% survival in 100% effluent.

Tests following the completion of a new treatment facility in 1997 continue to indicate that there is a reasonable potential to cause acute conditions in the receiving water in accordance with WAC 173-205-050(2)(a). An acute toxicity limit is therefore required. **The acute toxicity limit is no statistically significant difference in test organism survival between the acute critical effluent concentration (ACEC), 1.6 % of the effluent, and the control.**

The acute toxicity limit is set relative to the zone of acute criteria exceedance (acute mixing zone) established in accordance with WAC 173-201A-100. The acute critical effluent concentration (ACEC) is the concentration of effluent existing at the boundary of the acute mixing zone during critical conditions.

Monitoring for compliance with an acute toxicity limit is accomplished by conducting an acute toxicity test using a sample of effluent diluted to equal the ACEC and comparing test organism survival in the ACEC to survival in nontoxic control water. The Permittee is in compliance with the acute toxicity limit if there is no statistically significant difference in test organism survival between the ACEC and the control.

### Chronic Toxicity

As required in the current permit, the refinery conducted a one year chronic WET characterization study that included quarterly samples and chronic bioassay testing using a prescribed definitive dilution series and three organisms. The three organisms tested were sheepshead minnow, oyster larvae, and echinoderm sperm. The following are the results of the chronic characterization study:

<b>SAMPLE DATE</b>	<b>SHEEPSHEAD MINNOW NOEC % Effluent</b>	<b>OYSTER LARVAE NOEC % EFFLUENT</b>	<b>ECHINODERM SPERM NOEC % Effluent</b>
4/1/91 – 4/3/91	25	10	100
8/27/91	100	10	50
12/12/91	12.5		25
2/18/92	12.5	1	<6.25
2/27/92		5	
5/11/94		17.5	17.5

The wastewater treatment plant has since been upgraded. No chronic testing has been conducted since the wastewater plant upgrade. In addition the tests completed in 1991 through 1992 do not meet current test criteria. In accordance with WAC 173-205-060, the Permittee must repeat this effluent characterization.

### HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state



by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the effluent is likely to have chemicals of concern for human health. The discharger's high priority status is based on its status as a major discharger and knowledge of data and process information indicating that regulated chemicals occur in the discharge. The discharge was therefore evaluated for reasonable potential to violate the human health criteria.

A determination of the discharge's potential to cause an exceedance of the water quality standards was conducted as required by 40 CFR 122.44(d). The reasonable potential determination was evaluated with procedures given in the Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) and the Department's Permit Writer's Manual (Ecology Publication 92-109, July, 1994).

Human health criteria are required to be met at the edge of the chronic zone. The design conditions for determining the mixing ratio at the edge of the chronic zone are somewhat different as compared to the design conditions for the aquatic life criteria determination. The allowable design conditions will result in a larger mixing zone ratio for human health criteria for carcinogens. The ratio was determined to be 127 for non-carcinogens and 152 for carcinogens (see above).

**Appendix N** tabulates the human health criteria and an evaluation for the reasonable potential to exceed. **Pesticides, PCB's, PBB's, and asbestos** were excluded from the evaluation because they have not been found in the past and are unlikely to be present in the effluent. This assumption is based on process knowledge and past testing.

Reasonable potential to exceed human health criteria was determined for each parameter using an Ecology Excel spreadsheet. **Appendix N** tabulates the reasonable potential determination.

With the exception of arsenic discussed below, no parameters demonstrated reasonable potential to exceed human health criteria therefore no permit limits will be included in the permit based on human health criteria. However two parameters were not adequately characterized. The test methods used for these parameters did not meet the detection limits necessary to evaluate reasonable potential to exceed the extremely low human health criterion. In order to more adequately characterize the effluent, the NPDES permit will include a condition requiring additional human health criteria parameter testing with the necessary detection limits identified for those parameters with low criterion values. The permittee will be required to meet these detection levels if the test methods are available.

Page 2 of **Appendix N** back calculates the detection limit necessary in order to adequately determine if there is reasonable potential to exceed the criteria for those parameters where there was inadequate information. The permit will require 4 samples

to be characterized for human health parameters. The required detection limit increases as the number of samples increases. This is documented on page 2 of **Appendix N**. The permittee may find it advantageous to increase the number of samples tested for these parameters. The information produced as a result of the additional testing will be evaluated at the time of the next NPDES permit reissuance.

### **Arsenic**

In 1992 the USEPA adopted risk-based arsenic criteria for the protection of human health for the State of Washington. The criterion for marine waters is 0.14 µg/L inorganic arsenic, and is based on exposure from fish and shellfish tissue ingestion. The freshwater criterion is 0.018 µg/L, and is based on exposure from fish and shellfish tissue and water ingestion. These criteria have caused confusion in implementation because they differ from the drinking water maximum contaminant level (MCL) of 50 µg/L, which is not risk-based, and because the human health criteria are sometimes exceeded by natural background concentrations of arsenic in surface water and ground water.

A regulatory mechanism to deal with the issues associated with natural background concentrations of arsenic in groundwater-derived drinking waters is currently lacking. Consequently, the Water Quality Program, at this time, has decided to use a three-pronged strategy to address the issues associated with the arsenic criteria. The three strategy elements are:

- 1. Pursue, at the national level, a solution to the regulatory issue of groundwater sources with high arsenic concentrations causing municipal treatment plant effluent to exceed criteria.** The upcoming revision of the MCL for arsenic offers a national opportunity to discuss how drinking water sources can affect NPDES wastewater dischargers. This discussion should focus on developing a national policy for arsenic regulation that acknowledges the risks and costs associated with management of the public exposure to natural background concentrations of arsenic through water sources.
- 2. Additional and more focussed data collection.** The Water Quality Program will in some cases require additional and more focussed arsenic data collection, will encourage or require dischargers to test for source water arsenic concentrations, and will pursue development of a proposal to have Ecology's Environmental Assessment Program conduct drinking water source monitoring as well as some additional ambient monitoring data. At this time, Washington NPDES permits will contain numeric effluent limits for arsenic based only on treatment technology and aquatic life protection as appropriate.
- 3. Data sharing.** Ecology will share data with USEPA as they work to develop new risk-based criteria for arsenic and as they develop a strategy to regulate arsenic.

This permit does not include any limitations for arsenic. Arsenic is measured in Equilon's effluent during Ecology's sampling inspections and will be sampled by Equilon during the permit term as required by other permit conditions.

## Dioxin

Dioxins have been found in some Canadian and Californian refinery effluents. The dioxins were traced to an internal waste stream from the regeneration of catalytic reformer units. The Equilon refinery has two catalytic reformer units (CRU1 & CRU2) both Universal Oil Process (UOP) licensed with a platforming process. The reformers are semi-regenerative and each of the units is regenerated on an annual basis.

Dioxin has not been detected in Equilon's final effluent, and even if present would be difficult to detect due to dilution and the infrequent generation of the caustic wash water from the reformers. In the previous permit, Equilon was required to monitor total dioxin and furan (TCDD and TCDF) concentrations in the wastewater stream from the refinery's catalytic reformer units during regeneration. Samples were collected in 1990. Interferences made quantification very difficult. Results are tabulated below.

DATE	Sample Type	2,3,7,8 TCDF (pg/l)	2,3,7,8 TCDD (pg/l)
3/26/90	Caustic Blank	<1.3	< 2.3
CRU #1	1 <sup>st</sup> Caustic Wash	< 1.5	< 2.7
	2 <sup>nd</sup> Caustic Wash	930	< 2.8
	2 <sup>nd</sup> Caustic Wash (duplicate)	920	< 3.3
	Method Blank	< 1.8	<3.9
6/19/90	Caustic Blank	20	< 6.0
CRU #2	1 <sup>st</sup> Caustic Wash	< 2.8	< 2.7
	2 <sup>nd</sup> Caustic Wash	< 5	< 2.8
	2 <sup>nd</sup> Caustic Wash (duplicate)	3200	140
	Method Blank	< 2.4	< 2.7
	Retest 2 <sup>nd</sup> Caustic Wash	7000	310
	Method Blank	< 5.6	< 5.5
7/12/90	Caustic Blank	Not assayed due to high H <sub>2</sub> S	
CRU #2	1 <sup>st</sup> Caustic Wash	< 40	< 120
	2 <sup>nd</sup> Caustic Wash	< 120	< 110
	2 <sup>nd</sup> Caustic Wash (duplicate)	< 31	< 24
	Method Blank	< 320	< 15

Further investigation into the generation of dioxins at refineries has been determined by the Department to be necessary. The draft permit requires Equilon to test the catalytic

regeneration waste stream during each caustic wash at each reformer during two separate regeneration events. The analysis will include chlorinated dioxins and furans (2,3,7,8-Cl substituted tetra- through octa - congeners). The permit specifies the method to be used and the detection level required. The volume of wastewater generated in each sampled caustic wash must also be determined so that the mass of dioxin discharged to the oily water sewer can be determined, if any is detected.

The fate of any dioxins and furans will also be investigated. Literature has shown that dioxins tend to bind to particulate matter in the wastewater, much of which settles out in the API separators. Equilon will be required to take two grab samples of API sludge that are representative of time periods when regeneration of the catalytic reformers is occurring. The results of the wastewater and API sludge analyses shall be submitted to the department within three months of the last sampling event.

#### SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400). A sediment monitoring study was completed as part of the NPDES permit issued in 1990. No metals were found in excess of sediment quality standards during the 1992 study. The detection levels for mercury and cadmium were slightly above the state quality sediment standard. Some polycyclic aromatic hydrocarbons (PAH's) were detected in the sediments but were at levels below the state quality sediment standards. Toxicity testing was completed and toxicity was found. Ecology conducted a sampling inspection in May of 1994. Sediment samples near the outfall were taken during that inspection. The facility also sampled and tested sediment samples during this inspection. Several organics were detectable in the sediments but were at levels well below sediment standards with one exception. Bis (2-ethylhexyl) phthalate was found at 996 mg/kg on a dry weight basis. The standard is 47 mg/kg. This has been a common lab contaminant but the level found in the sample was considerably higher than would be expected if that were its source. There is no identifiable source of this pollutant in the refinery and a possible source was never identified. Toxicity tests were also completed and no toxicity was identified. The tests completed by the refinery also identified bis (2-ethylhexyl) phthalate as being present however the level present was determined to be at 13mg/kg on a dry weight basis. This value is below the sediment standard of 47 mg/kg on a dry weight basis.

The available discharge and receiving environment data will be further evaluated (as specified in the Sediment Management Standards, Part IV: Sediment Source Control, WAC 173-204-400) to determine what source control, monitoring, or cleanup actions are required. A condition has been placed in the proposed permit which requires the Permittee to demonstrate that either the point of discharge is not an area of deposition or, if the point of discharge is a depositional area, that there is not an accumulation of toxics in the sediments. The additional sediment monitoring will be required to be completed towards the end of the permit cycle so that the data will be available for consideration during the next NPDES permit reissuance. Any actions required, as a

result of detailed evaluation will be issued via administrative order. No actions are being considered at this time.

## GROUND WATER QUALITY LIMITATIONS

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect beneficial uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100).

Equilon has no unpermitted direct discharges to ground with the exception of the wastewater facility's final holding ponds, which polish the final effluent. These two ponds were originally constructed with a clay lining but no engineering plans document this and the construction details are not longer available. They therefore could potentially discharge to groundwater. The center of the final pond is located - approximately 200 feet from Fidalgo Bay while the center of the smaller south pond is approximately 375 feet from Fidalgo Bay. If a discharge from these ponds is occurring it is discharging almost directly into the Bay where the final effluent is currently discharged via a marine outfall. The discharge would consist of high quality wastewater treated to secondary treatment levels. **Appendix O** compares the pertinent groundwater criteria with Equilon effluent data. Pesticides, PCB's, dioxins, radionuclides and dyes were not included in the analysis since they are unlikely to be present in the effluent or present in detectable quantities. The concentrations of ground water quality parameters in Equilon's effluent were in general found to be less than the groundwater quality criteria. Only four metal parameters, cadmium, selenium, iron and arsenic exceeded the criteria. Arsenic was the only parameter that was significantly higher than the criteria. Incidental leakage of effluent of this quality and in this location should have undetectable or minimal impacts to ground water quality. The volume of groundwater, which would potentially be impacted, would be very small and impacts would occur just prior to its entering the surface water, which is the current discharge location.

The facility also has a waste activated sludge land treatment facility. Thickened and digested waste activated sludge is sprayed onto this land treatment field. The sprayfield has a plastic liner and a leachate collection system, which returns leachate to the treatment system. There should be no leakage from this system.

Therefore no limitations or actions are required based on potential effects to ground water.

## MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved. As discussed above, additional monitoring will be required to ensure that the discharge meets both water quality and human health criteria.

The monitoring and testing schedule is detailed in the permit. Specified monitoring frequencies takes into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

## CHROMIUM

Chromium's use was discontinued in 1989. The only source of chromium in the refinery is the crude oil. Monitoring data have consistently demonstrated very low levels of chromium such that it no longer remains a pollutant of concern. Because it remains in the federal effluent guidelines it must still occasionally be monitored for. Monitoring for this parameter has therefore been reduced to a semiannual frequency.

## PERFORMANCE BASED REDUCTION OF MONITORING FREQUENCIES

EPA published guidance in April of 1996 entitled, "Interim Guidance for Performance-Based Reduction of NPDES Permit Monitoring Frequencies". EPA's goal is to reduce the regulatory burden associated with reporting and monitoring on the basis of excellent performance. The guidance provides a tool to evaluate the facility's performance. Several parameters in Equilon's treated effluent were evaluated using this guidance. Ammonia, BOD, phenols, sulfide and fecal coliforms were evaluated. The guidance recommends looking at and comparing long term average values to permit limits. In addition to using the approach recommended in the guidance, maximum values were also compared with permit limits. The following table summarizes data since August 1997 and the current and proposed monitoring frequencies. The treatment plant upgrade was finished in August of 1997 therefore data since that date is more representative of current treatment plant performance.

<b>Pounds/Day with the exception of Fecal coliforms</b>	<b>Ammonia</b>	<b>BOD</b>	<b>Phenols</b>	<b>Sulfides</b>	<b>Fecal Coliforms organisms/ 100mls</b>
Monthly average permit limit in current permit	480	710	4.6	3.8	200
Daily maximum permit limit in current permit	1040	1290	9.6	8.4	400
Long-term average (8/97 - 5/00) (geometric mean for fecal coliforms)	171	112	0.30	0.54	4
Long-term average/ monthly average permit limit (percent basis)	36%	16%	7%	14%	2%
Maximum of the monthly averages	302	262	0.84	2.9	15
Maximum Value	810	882	9	6	302
Current permit monitoring frequency	7/7	3/7	7/7	7/7	5/7
Policy monitoring recommendations	3/7	1/7	1/7	1/7	1/7
Proposed permit monitoring frequency	3/7	1/7	1/7	1/7	1/7

For the parameters evaluated, Equilon's monitoring history has demonstrated an ability to consistently meet the regulatory limits. The proposed monitoring frequencies are

based on the guidance recommendations. Total suspended solids, COD and oil and grease will continue to be monitored daily. These parameters will give an indication if the wastewater treatment facility is having a problem. Equilon will be expected to maintain the performance levels to continue to receive the reduced monitoring frequencies. If the performance levels of the facility deteriorate, monitoring frequencies will revert to the frequencies in the current permit.

## **LAB ACCREDITATION**

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, Accreditation of Environmental Laboratories. Equilon originally achieved laboratory accreditation on November 1, 1991, and continues to renew this accreditation annually. The last onsite evaluation of Equilon's lab was conducted on June 1, 1998. Equilon's most recent accreditation was effective on November 1, 1999 and expires November 2, 2000. Equilon is accredited for the following parameters: ammonia, BOD, COD, Total residual chlorine, dissolved oxygen, hexane extractable O&G, pH, total phenolics, TSS, sulfide, chromium, hexavalent chromium, and fecal coliforms.

## **POLLUTION PREVENTION PLANNING**

### POLLUTION PREVENTION TO DATE

The refinery submitted a Pollution Prevention Plan to Ecology on August 26, 1992 in compliance with the requirements of Chapter 173-307 WAC. Progress reports have been submitted annually. The refinery has aggressively pursued pollution prevention and recycling strategies for a number of years. In 1991, wastewater treatment plant operations generated and disposed of 328 tons of hazardous waste. In 1995, all hazardous wastes generated by wastewater treatment plant operations were either recycled to produce petroleum coke or reused as fuels.

The refinery has implemented a number of pollution prevention projects and strategies that have had a positive impact on wastewater treatment plant operations. Cooling water treatment systems, which formerly used hexavalent chromium, have been replaced with phosphate-based systems. This has resulted in significant reduction in the quantity of chromium discharged to the wastewater treatment plant. A number of condensate recovery projects were completed which recycle hot condensate back to the operating units and reduce the quantity and temperature of the wastewater discharged to the treatment plant while improving the energy efficiency of the facility. The refinery has discontinued the use of hazardous parts cleaning solvents and has implemented a non-hazardous solvent in its parts cleaning washers. The facility has installed solids recovery traps to recover stormwater solids that would otherwise be discharged to the sewer and end up as hazardous wastes at the wastewater treatment plant. In 1995, the refinery completed the installation of a new Dissolved Air Flootation (DAF) unit at the wastewater treatment plant, which has greatly enhanced the removal of oils from the facility wastewater. In late summer of 1997 the refinery completed a \$10.8 million upgrade of the biological section at the wastewater treatment plant, designed to

dramatically enhance removal of pollutants from the facility's wastewater. The facility has also successfully worked with the manufacturer of cleaning products used on site to reformulate their products to reduce their toxicity.

For more information, the facility's Pollution Prevention Plan is available for public review.

#### NEW REQUIREMENTS

Although many of the pollution prevention strategies identified and implemented under these requirements also reduce pollutant impacts on water quality, the Permittee has in the past not been directed to specifically review and evaluate facility processes and activities for the source reduction and control of water pollutants. A water-oriented pollution prevention plan is being required in the proposed permit. Ecology's goals and objectives for developing and implementing pollution prevention plans are to identify, reduce, eliminate, and prevent the generation and release of pollutants to influent wastewater streams, stormwater, and/or waters of the state and to prevent violations of surface water, ground water, and sediment quality standards. The identification, evaluation, and selection of pollution prevention opportunities will be documented in the plan submitted to Ecology. Although crude oil can be considered a hazardous substance, Equilon will not be required to look for raw material feedstock substitutions for crude oil, since refineries have no practical ability to reduce the quantity or toxicity of crude oil.

The plan should comprehensively address all sources of water pollutants. Previous requirements have focused on specific types of sources (e.g., BMPs). These specific requirements are discussed in more detail in the following paragraphs. While the pollution prevention plan is not limited to these specific areas, it should address them using existing guidance. Equilon will be expected to apply the methodologies from existing guidance to cover other sources, pathways, or measures not covered within the strict scope of that guidance.

The pollution prevention plan requirements include the identification and implementation of Best Management Practices (BMPs). Pursuant to RCW 90.48 and Sections 302 and 402 for the Clean Water Act, BMPs may be incorporated as permit conditions. BMPs are actions or procedures to prevent or minimize the potential for the release of pollutants or hazardous substances in significant quantities to surface waters. BMPs, though normally qualitative, are most effective when used in conjunction with numerical effluent limits in NPDES permits.

The plan requirements also address stormwater pollution prevention. Ecology has developed guidance for the prevention of stormwater runoff contamination, entitled *Stormwater Pollution Prevention Planning for Industrial Facilities* (September 1993). The pollution prevention plan may incorporate the appropriate sections of any other plans previously developed by the refinery, which include procedures for prevention of stormwater runoff contamination. These plans, however, will not be all inclusive of the BMPs necessary for prevention of stormwater pollution by more conventional pollutants



– in particular, total suspended solids. They will also not address “clean” areas of the facility, that is those areas where petroleum products or hazardous materials are not stored or used. These “clean” areas contribute conventional pollutants to the facility’s stormwater.

The pollution prevention plan requires a review of solid waste handling and disposal procedures to prevent solid waste and solid waste leachate from causing pollution of state waters. In addition, the plan will include a description of measures already taken to prevent the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs.

## **OTHER PERMIT CONDITIONS**

### **REPORTING AND RECORDKEEPING**

The conditions of S3. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

### **NON-ROUTINE AND UNANTICIPATED DISCHARGES**

Occasionally, this facility may generate wastewater, which is not characterized in their permit application because it is not a routine discharge, and was not anticipated at the time of application. These typically are waters used to pressure test storage tanks or fire water systems or leaks from drinking water systems. These are typically clean wastewaters but may be contaminated with pollutants. The permit contains an authorization for non-routine and unanticipated discharges. The permit requires a characterization of these wastewaters for pollutants and examination of the opportunities for reuse. Depending on the nature and extent of pollutants in this wastewater and opportunities for reuse, Ecology may authorize a direct discharge via the process wastewater outfall or through a stormwater outfall for clean water, require the wastewater to be placed through the facilities wastewater treatment process or require the water to be reused.

### **OUTFALL EVALUATION**

Proposed permit condition S.3G requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and diffusers and to evaluate the extent of sediment accumulations in the vicinity of the outfall.

### **TREATMENT SYSTEM OPERATING PLAN**

In accordance with state and federal regulations, the Permittee is required to take all reasonable steps to properly operate and maintain the treatment system (40 CFR 122.41(e)) and WAC 173-220-150 (1)(g). An operation and maintenance manual was submitted as required by state regulation for the construction of wastewater treatment

facilities (WAC 173-240-150). It has been determined that the implementation of the procedures in the Treatment System Operating Plan is a reasonable measure to ensure compliance with the terms and limitations in the permit. The operating plan submitted by Equilon will need to be updated upon issuance of the new NPDES permit. The permit also includes a condition requiring it to be updated and resubmitted with the NPDES permit application.

## **GENERAL CONDITIONS**

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual industrial NPDES permits issued by the Department.

## **PERMIT ISSUANCE PROCEDURES**

### **PERMIT MODIFICATIONS**

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards for Surface Waters, Sediment Quality Standards, or Water Quality Standards for Ground Waters, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

### **RECOMMENDATION FOR PERMIT ISSUANCE**

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this proposed permit be issued for 5 years.

## **REFERENCES FOR TEXT AND APPENDICES**

Environmental Protection Agency (EPA)

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1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

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## APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

The Department will publish a Public Notice of Draft (PNOD) on August 8, 2001 in the *Skagit Valley Herald* and the *Anacortes American* to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Nancy Kmet  
Department of Ecology  
Industrial Section  
PO Box 47706  
Olympia, WA 98504

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (360) 407-6941, or by writing to the address listed above.

This permit and fact sheet was written by Nancy Kmet.

## APPENDIX B--GLOSSARY

**Acute Toxicity**--The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

**AKART**-- An acronym for "all known, available, and reasonable methods of treatment".

**Ambient Water Quality**--The existing environmental condition of the water in a receiving water body.

**Ammonia**--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

**Average Monthly Discharge Limitation** --The average of the measured values obtained over a calendar month's time.

**Best Management Practices (BMPs)**--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

**BOD<sub>5</sub>**--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD<sub>5</sub> is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

**Bypass**--The intentional diversion of waste streams from any portion of a treatment facility.

**Chlorine**--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

**Chronic Toxicity**--The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

**Clean Water Act (CWA)**--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

**Compliance Inspection - Without Sampling**--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

**Compliance Inspection - With Sampling**--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

**Composite Sample**--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

**Construction Activity**--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

**Continuous Monitoring** --Uninterrupted, unless otherwise noted in the permit.

**Critical Condition**--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

**Dilution Factor**--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

**Engineering Report**--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

**Fecal Coliform Bacteria**--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

**Grab Sample**--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

**Industrial Wastewater**--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

**Major Facility**--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

**Maximum Daily Discharge Limitation**--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

**Method Detection Level (MDL)**--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

**Minor Facility**--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

**Mixing Zone**--An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

**National Pollutant Discharge Elimination System (NPDES)**--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

**pH**--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

**Quantitation Level (QL)**-- A calculated value five times the MDL (method detection level).

**Responsible Corporate Officer**-- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

**Technology-based Effluent Limit**--A permit limit that is based on the ability of a treatment method to reduce the pollutant.



**Total Suspended Solids (TSS)**--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

**State Waters**--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

**Stormwater**--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

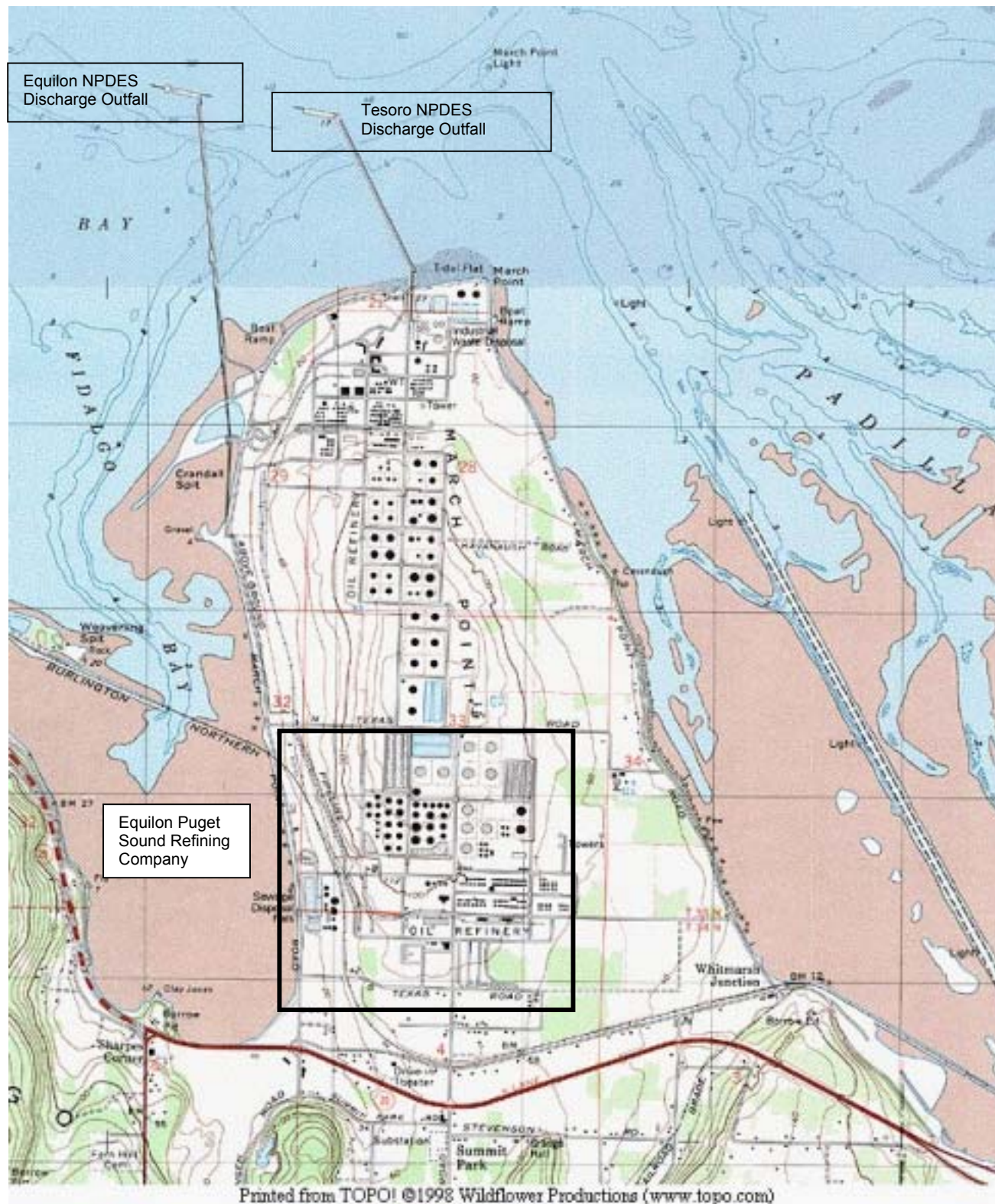
**Upset**--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

**Water Quality-based Effluent Limit**--A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

## **APPENDIX C--TECHNICAL CALCULATIONS**

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at <http://www.wa.gov.ecology>.

## APPENDIX D – OUTFALL LOCATION



**APPENDIX E—DISCHARGE MONITORING DATA**

**APPENDIX F—SIZE AND PROCESS FACTOR DETERMINATION**

**APPENDIX G—TECHNICAL BASED PERMIT LIMITATIONS**

**APPENDIX H—STORMWATER DATA**

**APPENDIX I—STORMWATER OUTFALLS & LOCATION**



**APPENDIX J—CONSTRUCTION PROJECT LOCATIONS**

**APPENDIX K—AQUATIC LIFE CRITERIA REASONABLE POTENTIAL ANALYSIS**

**APPENDIX L—WATER QUALITY BASED LIMITS FOR CHLORINE**

**APPENDIX M—ACUTE BIOMONITORING DATA**

**APPENDIX N— HUMAN HEALTH CRITERIA REASONABLE POTENTIAL  
ANALYSIS**

**APPENDIX O—GROUNDWATER EVALUATION**